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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/787,381	02/26/2004	Florian O. Mertens	GP-304820	4785
60770 7590 05/11/2010 General Motors Corporation c/o REISING, ETHINGTON, BARNES, KISSELLE, P.C. P.O. BOX 4390 TROY, MI 48099-4390				
EXAMINER WARTALOWICZ, PAUL A				
ART UNIT 1793		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/787,381

Applicant(s)

MERTENS ET AL.

Examiner

PAUL A. WARTALOWICZ

Art Unit

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) See Continuation Sheet is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-5,7,8,10-12,14,15,19-21,26-29,48,49,54,55,57,61,63-70,72-76,80-82,84 and 88 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-840)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 3/3/10
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continuation of Disposition of Claims: Claims pending in the application are 1,3-5,7,8,10-12,14,15,19-21,26-29,48,49,54,55,57,61,63-70,72-76,80-82,84 and 88.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 2/9/10 have been fully considered but they are not persuasive.

Applicant argues that neither the Machin paper nor Amendola anticipate/suggest a method comprising an initiation reaction and a second reaction for producing hydrogen from a prepared mixture of hydride particles and hydroxide particles using water to initiate a hydrogen release reaction.

It appears that initially water is mixed with LiH (page 2207). As this reaction progresses, lithium hydroxide hydride is formed such that a reaction between LiH and lithium hydroxide hydrate takes place in the presence of a large dose of water to produce hydroxide and hydrogen (page 2207, 2217). Therefore, it appears that Machin "prepares" a mixture of hydride and hydroxide. The hydroxide can then react with remaining hydride to produce lithium oxide and more hydrogen (page 2207, 2216, reaction 22). Additionally, it appears that some dependent claims require this feature (claim 3, for example).

It is noted the claim does not require an initial mixture of hydride and hydroxide before the reaction commences, only preparing a mixture of particles of a hydride and a hydroxide. In the instant case of Machin, a mixture of hydride and hydroxide is formed *in situ* during the reaction of water with lithium hydride. The limitation in claim 1, *inter alia*, of "for release of hydrogen upon demand; and, upon a demand for hydrogen from the mixture" appears to be intended use and does not limit the claim. In response to

applicant's argument that the prior art does not teach a method for release of hydrogen upon demand; and, upon a demand for hydrogen from the mixture, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Even if the claims did require an initial mixture of hydride and hydroxide, *arguendo*, it is unclear whether the limitation would be patentable over the prior art as changes in sequence of adding ingredients is *prima facie* obvious. MPEP 2144.04 (IV) (C).

Additionally, it appears that a first portion of the hydride in the mixture is reacted with water to produce heat in an amount to initiate the reaction between the hydride and the hydroxide as Machin teaches that lithium oxide and hydrogen are formed from the reaction between hydride and hydroxide (page 2206, 2216) and a temperature suitable for the production of the oxide and hydrogen from the hydride and hydroxide (sample 5B, page 2215). Some of the reaction runs take place at a temperature of 121°C such that a reaction between the hydride and hydroxide would be initialized (Sample 5B, page 2217). Therefore, Machin teaches a method for producing lithium hydroxide via a reaction of lithium hydride and water wherein the reaction takes place at 121°C which is sufficient to initialize the reaction between hydride and hydroxide. Additionally, it appears that the reaction between lithium hydride and water of Machin is substantially similar to that of the current invention. See page 2208 of Machin and paragraph 0107

of Applicant's PG Pub. Therefore, it appears that the amount of heat produced by the reaction of the prior art and the current invention would be substantially similar in the absence of a showing to the contrary.

Applicant argues that neither Machin nor Amendola contemplate reacting water with hydride to produce heat that initiates the reaction between hydride and hydroxide. However, in view of the foregoing it appears that a reaction between lithium hydride and water occur such that heat would inherently be formed that initiates the reaction between lithium hydride and lithium hydroxide.

Regarding claim 72, Applicant argues that Machin does not anticipate/suggest forming a starting mixture of LiH and hydrated lithium hydroxide to be fully reacted to form hydrogen and lithium oxide.

However, Machin teaches a method for producing lithium hydroxide via a reaction of lithium hydride and water wherein the reaction takes place at 121°C which is sufficient to initialize the reaction between hydride and hydroxide (Sample 5B, page 2217). Additionally, hydrated lithium hydroxide is formed during the experiment (page 2217). Therefore, it appears that hydrated lithium hydroxide is formed and decomposed to lithium hydroxide and hydrogen and that the temperature of some of the runs (5B) is sufficient to react lithium hydroxide and lithium hydride to form lithium oxide and hydrogen.

Additionally, the claim does not require an initial starting mixture of lithium hydride and hydrated lithium hydroxide.

This action is made non-final because claim 15 was rejected under the 35 U.S.C. 102/103 rejection over Machin in Office Action mailed 11/12/2009. Claim 15 should have been rejected under 35 U.S.C. 103 over Machin in view of Amendola. Claim 15 is now rejected under 35 U.S.C. 103 over Machin in view of Amendola.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1, 3-5, 7, 8, 10-12, 14, 19-21, 26-29, 54-55, 57, 63, 67-70, 72-76, 80-82, 84 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Machin et al. ("Kinetics of the Reaction of Water Vapour with Crystalline Lithium Hydride").

Machin et al. teach a method for producing hydrogen (page 2205) wherein lithium hydroxide hydrate is reacted with lithium hydride in particle form (page 2206) in the presence of water to produce hydrogen (page 2217).

It appears that Machin et al. teach water, lithium hydroxide, and lithium hydride are present in quantities such that the reaction of the reactions would be inherently taught including production of heat by the reaction of lithium hydride and water.

Additionally, it appears that Machin et al. teach that LiH reacts with both LiOH and LiOH·H₂O (page 2216, 2217) such that claims 20, 21, 57, 74-76, 84 are taught by Machin.

Additionally, it appears that the embodiment disclosed in paragraphs 0105-0110 (it appears that applicant is referencing the PG Pub, as the specification filed does not have that many paragraphs) only requires water and hydride present initially and that the reaction between water and hydride produce heat **and** the hydroxide to be reacted with the remaining hydride. See paragraphs 0109 and 0110.

Regarding the hydride particles and hydroxide particles formulated to substantially react fully, it appears that Machin is concerned with providing an initial mixture of LiH and water in such proportions to react lithium hydride substantially completely with water and hydroxide as evinced by the disclosure at page 2207-8.

Specifically, Machin states that the nature of the product depended solely on the amount of water vapor (page 2208). Additionally, one of ordinary skill in the art would recognize that the amount of hydride and water needed to completely react the hydride with water and hydroxide is clearly delineated by reactions (i), (ii), (24), (22), inter alia (pp 2208, 2216, 2217).

Regarding the limitation in claims 1, 67, and 72 that the method is "for release of hydrogen upon demand; and, upon a demand for hydrogen from the mixture" appears to be intended use and does not limit the claim. In response to applicant's argument that the prior art does not teach a method for release of hydrogen upon demand; and, upon a demand for hydrogen from the mixture, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

Regarding claims 1 and 67, it appears that the reaction between lithium hydride and water of the prior art is substantially similar to that of the claimed invention such that a similar amount of heat would be produced by each of the reactions in the absence of a showing to the contrary.

Regarding the limitation in claims 1 and 67 of preparing a mixture of particles of hydride and hydroxide; as the reaction of Machin progresses, lithium hydroxide hydride is formed such that a reaction between LiH and lithium hydroxide hydrate takes place in the presence of a large dose of water to produce hydroxide and hydrogen (page 2207,

2217). The hydroxide can then react with remaining hydride to produce lithium oxide and more hydrogen (page 2207, 2216, reaction 22). Additionally, it appears that some dependent claims require this feature (claim 3, for example).

Claims 15, 48, 49, 61, 64-66, and 88 are rejected under 35 U.S.C. 103(a) as being unpatentable over Machin et al. ("Kinetics of the Reaction of Water Vapour with Crystalline Lithium Hydride") in view of Amendola et al. (U.S. 2004/0033194).

Machin teaches a process as taught above in claim 1.

Machin fails to teach lithium borohydride as the hydride used in the hydrogen generating process.

Amendola et al., however, teach a method for hydrogen generation [0024] comprising lithium borohydride [0030] for the purpose of providing useful hydrogen generation systems [0026].

Therefore, it would have been obvious to one of ordinary skill in the art at the time applicant's invention was made to provide lithium borohydride [0030] in Machin in order to provide useful hydrogen generation systems [0026] as taught by Amendola et al.

Regarding claims 65, 65, and 88, it appears that Machin et al. teach that LiH reacts with both LiOH and LiOH·H₂O.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PAUL A. WARTALOWICZ whose telephone number is

(571)272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
May 7, 2010

/Stanley Silverman/
Supervisory Patent Examiner, AU 1793